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EXAMINER	
JEANGLAUDE, JEAN BRUNER	

ART UNIT	PAPER NUMBER
2819	

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	**Application No.** 10/682,552	**Applicant(s)** MELANSON, JOHN L.	
	Examiner Jean B. Jeanglaude	**Art Unit** 2819	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *amendment filed on 2-9-06*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-20* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-20* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

Response To Amendments/Arguments

1. Applicant's arguments with respect to claims 1 - 20 have been considered but are moot in view of the new ground(s) of rejection.

DETAILED ACTION

Claim Objection

2. Claim 4 is objected to because of the following informalities: it is suggested to delete the word phrase “the input”, the first occurrence in claim 4, line 6. Appropriate correction is required.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

4. Claims 1 – 5, 7, 9, 10, 20 are rejected under 35 U.S.C. 102(a) as being anticipated by the Applicant admitted prior art (APA).

5. Regarding claims 1, 7, the APA discloses a digital signal processing system and method (fig. 1) comprising a delta sigma modulator (108) having an internal filter (110) coupled to a quantizer (112) wherein the delta sigma modulator implements a low-pass signal transfer function (figs. 1, 2); an input sample rate of the input samples to the delta sigma modulator is an integer multiple of an output sample rate of the delta sigma modulator [note in block 106 the decimation filter is characterized by 2fs → fs] and the internal filter (110) and quantizer (112) of the delta sigma modulator operate at the

output sample rate [as noted in fig. 1 the loop filter and the quantizer operate at the output].

6. Regarding claims 2, 3, the APA discloses a digital signal process system (fig. 1) wherein the output rate of the internal filter has a frequency of fs and the input sample rate has a frequency N times fs, wherein N is an integer greater than one [it is noted in fig. 1 the output sample rate of the loop filter has sample rate of fs. It can be seen that the delta sigma modulator has a frequency of fs that applied to it, thereby the loop filter or internal filter has a frequency of fs. The input frequency shown in fig. 1 is 2fs (in this case N=2)].

7. Regarding claims 4, 9, 10, the APA discloses a digital signal processing system and method (fig. 1) comprising an analog to digital converter (104) to convert an analog signal into digital data and provide the data to the delta sigma modulator (108) wherein the output sample rate of the delta sigma modulator has a frequency of fs and the sample rate has a frequency equal to N times fs wherein N is an integer greater than one [it is noted in fig. 1 the output sample rate of the loop filter has sample rate of fs. It can be seen that the delta sigma modulator has a frequency of fs that applied to it, thereby the loop filter or internal filter has a frequency of fs. The input frequency shown in fig. 1 is 2fs (in this case N=2)].

8. Regarding claim 5, the APA discloses a digital signal processing system (fig. 1) wherein the input data includes an audio signal [source signal] (fig.).

9. Regarding claim 20, the APA discloses an apparatus (fig. 1) for modulating input data sampled at N times a frequency f.sub.s (Mf.sub.s) using a delta-sigma modulator

operating at frequency Nf.sub.s, (fig. 1); the apparatus (fig. 1) comprising: means for receiving the input data having a sampling frequency Mf.sub.s (fig. 1) at an input of the delta signal modulator (108)[fig. 1] converting the input data into low pass filtered data having a sampled frequency of fs using an internal filter (110) of the delta sigma modulator (108) operating at the delta sigma modulator operating frequency of fs to generate output data [it is noted in fig. 1 the output sample rate of the loop filter has sample rate of fs. It can be seen that the delta sigma modulator has a frequency of fs that applied to it, thereby the loop filter or internal filter has a frequency of fs]; means (112) for quantizing the output data of the internal filter (110) using a quantizer operating at the delta sigma modulator (108) operating frequency of fs and means for providing feedback to the internal filter from the quantizer (note there is a feedback signal from the output of the quantizer to the internal (loop) filter).

Claim Rejections - 35 USC § 103

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

11. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over the APA in view of Steensgaard-Madsen (US Patent Number 6,271,782).

12. Regarding claim 6, the APA discloses all limitations as discussed above including delta sigma modulator (108) comprising a quantizer (112) and an internal filter (loop filter) (110) coupled to the quantizer (112) except the digital signal processing

wherein the internal filter comprises: a first integration stage to integrate a sum of a first sample of input data, output data from the delay stage, and first negative feedback data from the quantizer, wherein the first sample of the input data to the first integration stage includes a pair of data samples respectively modified by a first gain and a second gain; and a second integration stage to integrate the first sample of the input data, output data from the delay stage, and second negative feedback data from the quantizer, wherein the first sample of the input data to the second integration stage includes the pair of data samples respectively modified by a third gain and a fourth gain; wherein the first and second gains are an independent linear combination with respect to the third and fourth gains. However, Steensgaard-Madsen, in a related field, discloses a system (fig. 8) that comprises an internal filter [H(z)] comprises: a first integration stage (first block in fig. 8) to integrate a sum of a first sample of input data, output data from the delay stage (88M is a delay), and first negative feedback data [a(k)] from the quantizer, wherein the first sample of the input data to the first integration stage includes a pair of data samples respectively modified by a first gain and a second gain (fig. 8)[not the gain in fig. 8) ; and a second integration stage (second block in fig. 8) to integrate the first sample of the input data, output data from the delay stage (88Mis a delay), and second negative feedback data [a(k)] from the quantizer, wherein the first sample of the input data to the second integration stage includes the pair of data samples respectively modified by a third gain and a fourth gain (fig. 8)(note he plurality of gains in fig. 8) ; wherein the first and second gains are an independent linear combination with respect to the third and fourth gains (fig. 8). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify APA's system with that Steensgaard-Madsen in order to provide a stable delta sigma modulator structure in which a pipelined multi-set quantizer is used for the generation of a high resolution signal. The combination of the APA and Steensgaard-Madsen would achieve the same end result as the claimed invention- providing integration and decimation.

13. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over the APA in view of Fan (US Patent Number 6,433,726).

14. Regarding claim 8, the APA discloses all the limitations except the method wherein low pass filtering the input data comprises integrating and decimating the input data. However, Fan, in a related field, discloses a system (fig. 1) comprising a delta sigma modulator (150) in which a decimator (130) is implemented where decimator 130 decimates the input sampling data (col. 6, lines 40 – 44; col. 7, lines 22 – 25). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the APA's system with that of Fan in order to provide a system that selectively varies the output sampling rate such that the average output sampling rate corresponds to the desired output sampling rate.

Claim Rejections - 35 USC § 102

15. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

16. Claim 11 is rejected under 35 U.S.C. 102(a) as being anticipated by Applicant's admitted prior art (APA).

17. Regarding claim 11, the APA discloses a method of modulating input data sampled at M times a frequency f.sub.s (Mf.sub.s) using a delta-sigma modulator operating at frequency f.sub.s, the method (fig. 1) comprising: receiving the input data having a sampling frequency Mf.sub.s (the signal source) at an input of the delta sigma modulator (fs is the input sampling signal); converting the input data into low pass data having a sampled frequency of f.sub.s using an internal filter (110) of the delta-sigma modulator (108) operating at the delta sigma modulator frequency f.sub.s to generate output data (fig. 1); quantizing (112) the output data of the internal filter (110) using a quantize operating at the delta sigma modulator operating frequency fs (note the operating frequency of the delta sigma modulator is fs); and providing feedback to the internal filter from the quantizer (fig. 1).

Claim Rejections - 35 USC § 103

18. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

19. Claims 12 – 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over the APA in view of Steensgaard-Madsen (US Patent Number 6,271,782).

20. Regarding claim 12, the APA discloses all the limitations as discussed above except the method wherein converting the input data into low pass filter using the

internal filter of the delta-sigma modulator comprises: providing first and second data samples and first quantizer feedback data at the same time to a first integration stage, wherein the first and second data samples provided to the first integration stage are respectively modified by a first gain and a second gain; providing the first and second data samples and second quantizer feedback at the same time to a second integration stage, wherein the second integration stage receives output data from the first integration stage and the first and second data samples provided to the second integration stage are respectively modified by a third gain and a forth gain; wherein the first and second gains are an independent linear combination with respect to the third and fourth gains. However, Steensgaard-Madsen, in a related field, discloses a method (fig. 8)that comprises an internal filter [H(z)] comprises: a first integration stage (first block in fig. 8) to integrate a sum of a first sample of input data, output data from the delay stage (88M is a delay), and first negative feedback data [a(k)] from the quantizer, wherein the first sample of the input data to the first integration stage includes a pair of data samples respectively modified by a first gain and a second gain (fig. 8)(note the plurality of gains in fig. 8) ; and a second integration stage (second block in fig. 8) to integrate the first sample of the input data, output data from the delay stage (88Mis a delay), and second negative feedback data [a(k)] from the quantizer, wherein the first sample of the input data to the second integration stage includes the pair of data samples respectively modified by a third gain and a fourth gain (fig. 8)(note the plurality of gains in fig. 8); wherein the first and second gains are an independent linear combination with respect to the third and fourth gains (fig. 8). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify APA's system with that Steensgaard-Madsen in order to provide a stable delta sigma modulator structure in which a pipelined multi-set quantizer is used for the generation of a high resolution signal. The combination of the APA and Steensgaard-Madsen would achieve the same end result as the claimed invention- providing integration and decimation.

21. Regarding claim 13, the APA, discloses a method (fig. 1) comprising: converting the input data from an analog signal into a digital signal (104) at the frequency of M times f.sub.s immediately prior to converting the input data into low pass filtered data at a frequency of f.sub.s using the internal filter (110) of the delta-sigma modulator (108).

22. Regarding claim 14, discloses a method (fig. 1) wherein M divided N is two (fig. 1).

23. Regarding claim 15, the APA discloses a method (fig. 1) wherein the input data includes an audio signal (fig. 1).

24. Regarding claim 16, the APA a method (fig. 1) discloses a recording media encoded with data based on the output data generated using the method (page 1, last paragraph).

Claim Rejections - 35 USC § 103

25. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

26. Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over Fan in view of Steensgaard-Madsen.

27. Regarding claim 17, Fan discloses a method (fig. 1) comprising a delta sigma modulator (150) in which a decimator (130) is implemented where decimator 130 decimates the input sampling data (col. 6; lines 40 – 44; col. 7, lines 22 – 25). Fan's method does not comprises providing first and second data samples and first quantizer feedback data at the same time to a first integration stage, wherein the first and second data samples provided to the first integration stage are respectively modified by a first gain and a second gain; providing the first and second data samples and second quantizer feedback at the same time to a second integration stage, wherein the second integration stage receives output data from the first integration stage and the first and second data samples provided to the second integration stage are respectively modified by a third gain and a fourth gain; integrating output data from the second integration stage using N-subsequent integration stages to generate quantizer input data, wherein N is any non-negative integer; quantizing the quantizer input data; and wherein the first and second gains are an independent linear combination with respect to the third and fourth gains. However, Steensgaard-Madsen, in a related field, discloses a method (figs. 1 – 8) that provides first and second data samples and first quantizer feedback data at the same time to a first integration stage (fig. 8), wherein the first and second data samples provided to the first integration stage (first block in fig. 8) are respectively modified by a first gain and a second gain (fig. 8)[note the gains in fig. 8); providing the first and second data samples (fig. 8) and second quantizer feedback at the same time

to a second integration stage (second block in fig. 8), wherein the second integration stage (the second block in fig. 8) receives output data from the first integration stage (the first block in fig. 8) and the first and second data samples provided to the second integration stage are respectively modified by a third gain and a fourth gain (fig. 8) [note the gains in fig. 8); integrating output data from the second integration stage using N-subsequent integration stages (subsequent stages is for instance block 122) to generate quantizer input data (fig. 8), wherein N is any non-negative integer; quantizing (ADC in fig. 8 is used as a quantizer) the quantizer input data; and wherein the first and second gains are an independent linear combination with respect to the third and fourth gains (fig. 8) [as noted in fig. 8 the gains provided by the system/method are independent from each other]. Therefore, it would have been obvious to one of ordinary skill the art at the time the invention was made to modify Fan's system wit that of Steensgaard-Madsen's system in order to provide a stable delta sigma modulator structure in which a pipelined multi-set quantizer is used for the generation of a high resolution signal.

28. Claims 18, 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fan in view of Steensgaard-Madsen as applied to claim 17 above, and further in view of the APA.

29. Regarding claims 18, 19, Fan in combination with Steensgaard-Madsen discloses all the limitation as discussed above except the method wherein providing the first and second data samples comprises providing the first and second data samples directly from an analog-to-digital converter (claim 18); the method further comprising:

using the quantized input data to encode an audio signal on a recording medium (claim 19). However, the APA, in a related field, discloses a method (fig. 1) wherein providing the first and second data samples comprises providing the first and second data samples directly from an analog-to-digital converter (fig. 1); the method (fig. 1) further comprising: using the quantized input data to encode an audio signal on a recording medium (page 1, last paragraph). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Fan and Steensgaard-Madsen with that of the APA in order to increase the performance of the method.

Conclusion

30. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jean B. Jeanglaude whose telephone number is 571-272-1804. The examiner can normally be reached on Monday - Friday 7:30 A. M. - 5:00 P.M..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Rexford Barnie can be reached on 571-272-7492. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Jean Bruner Jeanglaude

Jean Bruner Jeanglaude
Primary Examiner
March 14, 2006